9900124

THIR UNIVERS OF AMIERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME;

Busch Agricultural, Resources, Inc.

THERE'S, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE EASIG SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN SPUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY SECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (I) SHALL BE SOLD BY VARIETY NAME ONLY AS A CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE

BARLEY

'B1614ml'

In Testimonn Thereof, I have hereunto set my hand and caused the seal of the Hunt Anxiety Protestion Office to be affixed at the City of Washington, D.C. this twelfth day of September, in the year two thousand one.

Attest:

Parl M Sunbound

Commissioner Plant Varioty Protection Office Asricultural Marketina Service Sylenomon Del Agriculture

PORT COLLING NORTH AND CONCROSS THE CONTROL OF THE APPLICATION FOR PLANT VARIETY PROTECTION OFFICE APPLICATION FOR PLANT VARIETY PROTECTION OFFICE APPLICATION FOR PLANT VARIETY PROTECTION OFFICE APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE (Institutions and Information Collection business of the Control of the Protection of the Control of th	REPRODUCE LOCALLY. Include form number and date on a	FORM APPROVED - OMB NO. 0581-005			
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17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act. YES (If 'yes, 'answer items 18 and 19 below)	a. (X) Exhibit A. Origin and Breeding History of the Variety b. (X) Exhibit B. Statement of Distinctness c. (X) Exhibit C. Objective Description of the Variety d. (X) Exhibit D. Additional Description of the Variety (Optional) e. (X) Exhibit E. Statement of the Basis of the Applicant's Ownership f. (X) Voucher Sample (2,500 viable untreated seeds or, for tuber propagated	d varieties verification that ti	ssue culture will be deposited and maintained		
8. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? YES NO					
19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED GENERATIONS? YES	YES (If "yes," answer items 18 and 19 below)	VARIETY NAME ONLY, AS A	A CLASS OF CERTIFIED SEED? (See Section) to item 20)	83(a) of the Plant Variety Protection Act)	
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20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES? YES (If "yes," give names of countries and dates) NO			☐ FOUNDATION ☐ REGISTERED	CERTIFIED	
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Pfant Variety Protection Act. Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties. IGNATURE OF APPLICANT (Owner(s)) MAME (Please print or type) NAME (Please print or type) DATE CAPACITY OR TITLE DATE	20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELE	EASED, USED, OFFERED FO	R SALE, OR MARKETED IN THE U.S. OR OTH	-	
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Exhibit A (revised)

Origin and Breeding History of B1614ml

Pedigree:

Induced mutagenesis of six-row malting barley B1614

History:

The use of mutagenesis in the improvement of barley is often an effective method to correct a defect in an otherwise acceptable and well-adapted variety. In the case of B1614, susceptibility to powdery mildew (*Erysiphe graminis* f. sp. *hordei*) was a limiting factor for this variety. In March 1993, approximately 1.0 kilogram of six-row malting barley B1614 (PVP 9100117) was subjected to a mutagenic treatment of Sodium Azide (N₃ Na).

The resulting M1 seed was field planted in isolation during April 1993. Germination vigor appeared to be reduced due to the mutagen, as well as the observation of several plants exhibiting lethal gene combinations. Those plants were removed from the population through the natural death of the plant prior to anthesis. Three thousand resulting M2 plants were grown in a disease screening greenhouse in December 1993 and subjected to a strong infection of powdery mildew through artificial inoculation. Only 1 plant survived the disease screening and was transplanted to an isolated field to complete its life cycle.

In November 1994, the progeny of that 1 surviving plant was increased in a greenhouse and subsequently hybridized with variety B1614 in January 1995. The resulting F1 plants were increased in a greenhouse and backcrossed to variety B1614 in May 1995. In June 1995, F1 seeds from 8 backcrosses were greenhouse increased and harvested to produce 8 F2 populations. Those 8 F2 populations were subjected to the powdery mildew screening greenhouse in October 1995 with 1 population being selected based on resistance to powdery mildew. From that 1 population, 4 plants were selected.

Twenty F3 rows (5 rows per selected plant) were evaluated in Northern France in March 1996 under natural powdery mildew infection conditions. All 20 rows showed good resistance to the natural infection and the 5 rows from each plant were bulked to form 4 different F4 populations. The four F4 populations were planted as plots in September 1996 in Argentina with one of the populations being discarded. The 3 remaining populations were rouged with 10% rejection, after which 100 spikes of each population were harvested, with the remainder of each plot bulked for a yield trial seed source. Yield trials were conducted in 1997 and 1998 during the respective growing seasons in Spain, France and Argentina.

One hundred F5 headrows of the 3 populations were grown in Fort Collins Colorado with 1 population of the 3 being selected. From that selected population, 8 of 100 headrows were selected and harvested as individual rows.

B1614ml is uniform and stable for the last 2 generations with less than 1 per 1000 variants (slightly taller plants) or off-types being detected. Purification of B1614ml was initiated in 1998 with ninety-six F6 headrows -- composed of 12 rows from each of the 8 selected rows of 1997 -- planted in Fort Collins. From those 96 headrows, 90 rows were selected and bulked to produce 1999 breeder seed. Certified seed will be available in the year 2001.

Statement of Distinctness

B1614ml is most similar to the spring barley variety "B1614", however it can be distinguished by the following characteristics.

- B1614ml has a V-shaped collar.
 B1614 has a closed collar.
- B1614ml has a parallel head shape.
 B1614 has a strap head shape.
- B1614ml shows a slight crease at the base of the lemma.
 B1614 has a transverse crease at the base of the lemma.
- B1614ml shows more resistance to powdery mildew (Erysiphe graminis f. sp. hordei)
 B1614 shows less resistance to powdery mildew (Erysiphe graminis f. sp. hordei)

Statistical Table for Powdery Mildew Resistance

(Erysiphe graminis f. sp. hordei)

<u>Variety</u>	Reaction * ety 1 = resistant, 9 = susceptible				
B1614ml	2.65	0.99			
B1614	3.92	1.09			

^{*} Results of 12 paired tests. Likelihood for the 2 varieties to have no difference is less than 0.001

U.S. DEPARTMENT OF AGRICULTURE AGRICULTURAL MARKETING SERVICE LIVESTOCK AND SEED DIVISION BELTSVILLE, MARYLAND 20705

EXHIBIT ((Barley) EXHIBIT C

OBJECTIVE DESCRIPTION OF VARIETY

BARLEY (HORDEUM VULGARE)	•
NAME OF APPLICANT(s) BUSCH AGRICULTURAL RESOURCES, INC.	FOR OFFICIAL USE ONLY PVPO NUMBER 9900124
ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)	VARIETY NAME OR TEMPORARY
3515 EAST COUNTY ROAD 52	DESIGNATION
FT. COLLINS, CO 80524 USA	B1614 ml
Place the appropriate number that describes the varietal character of this variety in the boxes belonged a zero in first box (i.e. OSI) or OSI) when number is either 99 or less or 9 or less.	ow.
1. GROWTH HABIT: 1 1=SPRING 2=FACULATIVE WINTER 3=WINTER 3 Early Growth: 1=PROSTRAT 3=ERECT	E 2=SEMIPROSTRATE
2. MATURITY (50%) Flowering): 1 = EARLY (California Mariout) 2 = MIDSEASON (Betzes) 3 = LATE (Frontier)	
No. of days Earlier than 1 = BETZES 2 = CALIFORNIA MARIOUT 3 =	CONQUEST 4=DICKSON
2 No. of days Later than 8 5=PIROLINE 6=PRIMUS 7=UNITAN 8=	MOREX
3. PLANT HEIGHT (From soil level to top of head): 3 1=SEMIDWARF 2=SHORT (California Mariout) 3=MEDIUM TALL (Betzes) 4=TALL (California Mariout) 4=TALL (California M	Conquest)
0 4 Cm. Shorter than 8 1=BETZES 2=CALIFORNIA MARIOUT 3=CONG	QUEST 4=DICKSON
Cm. Taller than 5=PIROLINE 6=PRIMUS 7=UNITAN 8=MORE	EX ·
3 = 10 - 15 cm. 0 5 NO. OF NODES (Originating from node above ground) 2 Collar Shape: 1 = CLOSED 2 = V-SHAPED 3 = OPEN 3 Shape of Neck: 1 = STRAIG	n: 1 = ABSENT 2 = PRESENT HT 2 = SNAKY (Specify) SLIGHTLY SNAKY
4=MODIFIED CLOSED OR OPEN 3=OTHER LEAF:	(Specify) DITORTH SNAKT
Basal leaf sheath (seedling): 1 = GLABROUS 2 = PUBESCENT 2 Position of flag leaf	(at boot stage): 1 = DROOPING 2 = UPRIGHT
Waxiness: 1 = ABSENT (Glossy) 2 = SLIGHTLY WAXY 3 = WAXY) MM. WIDTH (Fin	st leaf below flag leaf
2 3 CM. LENGTH (First leaf below flag leaf) Anthocyanin in leaf	sheath: 1 = ABSENT 2 = PRESENT
. HEAD: 7 Type: 1 = TWO-ROWED 2 = SIX-ROWED Density: 1 = LAX 2 =	ERECT (Not dense)
□ 3=ERECT (De	ense) (Mid-lax) From Ex. D 17-11-1 (Glossy) 2=SLIGHTLY WAXY
3 Lateral Kernels Overlap: 1 = NONE 2 = AT TIP 3 = 1/4 - 1/2 OF HEAD 3 Rachis (Hair on edge):	1 = LACKING 2 = FEW 3 = COVERED
. GLUME: 3 Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA 2 1 = NONE 2 = S	
3 Length: 1 = 1/3 OF LEMMA 2 = 1/2 OF LEMMA 3 = MORE THAN 1/2 OF LEMMA 4 Hair covering: 1 = NONE 2 = RESTRICTED TO MIDDLE 3 = CONFINED TO BAND 4 = CON	
Awns: 1 = LESS THAN EQUAL TO LENGTH OF GLUMES 2 = EQUAL TO LENGTH OF GLUM 3 = MORE THAN EQUAL TO LENGTH OF GLUMES 3 Awn Surface: 1 = SMOOTH 2 = SEMISMOOTH 3 = ROUGH	

					•			٠.			-		990	0124
5	; !	1 = AWN 3 = SHOF 5 = LONG	RT ON 3 (long:	CENTRA er than s	\L ROWS, A spike) 6=1	CENTRAL RO WNLETS ON HOODED TH 3=SEM	LATE	RAL R	OWS 4=S	ERAL R HORT (OWS less t	han equal to		
3					3=NUME	ROUS	; [E [iir: 1=ABS achilla Hairs:				· · · · .	
. s	TIGMA Hairs:	\: 1 = FEW			RSE CREAS	Ē.	L					-	· · · · · · · · · · · · · · · · · · ·	
2	٠	1 = NAKI 1 = SH				T TO MIDLO	NG (7.					=ABSENT	2 = PRESEN	ıT
4		4 = MII	DLONG	TO LO	NG (9.0-10.	5 mm.) 5= TLY WRINKLI	LONG	(10.0	mm.)					
1 '		e Color: CENT AE			SS (White o	r Yellow) 2	=BLUE -		CMC DED	1000 6				
0 (1 					Suscentible	e, 2 = Resista		4 4	GMS. PER	1000 8	SCEDS	•		
	SEPTOR		,		т вьотсн	., <u>z – ricaigta</u>	0	SPOT	вьотсн		2	POWDERY N	ILDEW	<i>:</i>
<u>)</u> [.00SE :	SMUT	[0 BA	CTERIAL BL	IGHT	0	COVE	RED SMUT		0	FALSE LOOS	SE SMUT	
) s	STEM R	UST	[O LEA	F RUST		0	SCAB	12.		0	SCALD		
	Y	. (0. 1)		0 BSN			0	BYDV				OTHER (Spe	cify)	
	REEN E		ot lest			2 = Resistant	t)	0	CHINCH B	UG	Ī	ARMYWO	DRM	
		HOPPERS	S		CERIAL LEA			<u> </u>	OTHER (Sp		E			
HE	SSIAN	FLY RAC	CES		GP D	0 A 0 E		0	B F	0	C D			
. C	HEMIC	AL: (0:	=Not T	ested, 1	l = Suscepti	ble, 2 = Resis	tant}							
D	DT			0	OTHER (Sp	ecify):				 				•

0	DDT		0	OTHER (Specify):
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. INDICATE WHICH V	ARIETY MOST CLOSELY RESEM	BLES THAT SUBMITTED:	
CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	B1614	Seed size	B1614
Leaf size	B1614	Coleoptile elongation	B1614
Leaf color	B1614	Seedling pigmentation	B1614
Leaf carriage	B1614		

REFERENCES: The following publications may be used as a reference aid for the standardization of character descriptions and terms used in this form:

- 1. Wiebe, G.A., and D.A. Reid, 1961, Classification of Barley Varieties Grown in the United States and Canada in 1958, Technical Bulletin No. 1224, U.S. Dept. of Agriculture.
- 2. Reid, D.A., and G.A. Wiebe, 1968, Barley: Origin, Botany, Culture, Winter Hardiness, Genetics, Utilization, Pests, Agriculture Handbook No. 338, U.S. Dept. of Agriculture. pp. 61-84.
- 3. Malting Barley Improvement Association, Milwaukee, Wisconsin, 1971, Barley Variety Dictionary.

COLOR: Nickerson's or any recognized color fan may be used to determine color of the described variety.

3900124

Exhibit D

Botanical Description of B1614ml

B1614ml Is a six-row, mid-season spring barley bred and developed by Busch Agricultural Resources, Incorporated Ft. Collins, Colorado. It has good malting quality.

Juvenile growth habit is erect. Plant color at boot is green with an upright flag leaf. Head shape is parallel and mid-lax in density with a nodding head type. Neck is slightly snakey with a v-shaped collar. First rachis segment is slightly bent back. Base of the first segment is a margin flange. Rachis shape is plain with short hairs on the margins. Glume length is one-half the length of the kernel and glume hair is short completely covering the outer surface. The glume awns are rough and longer than the length of the glume. Lemma awns are rough and longer than the length of the spike. Lemma teeth are frequent. Lemma hair is absent and the base is a depression, showing a tendency to crease. Seed is covered, mid-long to long, finely wrinkled with wax slightly present. Aleurone is colorless. Palea tips are long. Rachilla length is one-half the length of the kernel with sparse short hairs all over. Ventral crease is wide lacking crease hairs and fence hairs.

B1614ml is a traditional upper midwest United States variety adapted to areas where powdery mildew (*Erysiphe graminis* f. sp. *hordei*) is prevalent such as Spain, France, and Argentina.

REPRODUCE LOCALLY. Include form number and date on all reproductions.	FORM APPROVED - OMB NO	O. 0581-0055 EXPIRES: 12-31-96		
U.S. DEPARTMENT OF AGRICULTURE AGRICULTURAL MARKETING SERVICE SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE	The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995			
EXHIBIT E STATEMENT OF THE BASIS OF OWNERSHIP		determine if a plant variety protection 2421). Information is held confidential 2426).		
1. NAME OF APPLICANT(S)	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME		
BUSCH: AGRICULTURAL RESOURCES, INC. and Advanced from the second		la are libraturo establica e la compa		
	B1614m			
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)	5. TELEPHONE (include area code)	6. FAX (include area code)		
3515 EAST COUNTY ROAD 52	970 221 5622	970 472 2334		
FORT COLLINS COLORADO 80524	7. PVPO NUMBER	9900124		
8. Does the applicant own all rights to the variety? Mark an "X" in appropriate bl	ock. If no, please explain.	X YES NO		
		,		
	**			
 Is the applicant (individual or company) a U.S. national or U.S. based company? If no, give name of country 		X YES NO		
10. Is the applicant the original breeder? If no, please answer the following:				
a. If original rights to variety were owned by individual(s): Is (are) the original breeder(s) a U.S. national(s)? If no, give name of co	esco in Passa el mayor in include Significa el Masso del filo con ciese	X YES NO		
	onay			
b. If original rights to variety were owned by a company: Is the original breeder(s) U.S. based company? If no, give name of cour	ntry	YES NO		
11. Additional explantion on ownership (If needed, use reverse for extra space):				
, and the same of		·		
	•			
PLEASE NOTE:				
Plant variety protection can be afforded only to owners (not licensees) who meet on	e of the following criteria:			
 If the rights to the variety are owned by the original breeder, that person must b of a country which affords similar protection to nationals of the U.S. for the sam 	e a U.S. national, national of a U e genus and species.	JPOV member country, or national		
If the rights to the variety are owned by the company which employed the origin nationals of a UPOV member country, or owned by nationals of a country which a genus and species.	al breeder(s), the company must affords similar protection to natio	be U.S. based, owned by onals of the U.S. for the same		
3. If the applicant is an owner who is not the original breeder, both the original bree	der and the applicant must meet	t one of the above criteria.		
The original breeder may be the individual or company who directed final breeding	g. See Section 41(a)(2) of the	e Plant Variety Protection Act for		

definition.

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990012*

Statement of the Basis of Applicant's Ownership

Busch Agricultural Resources, Incorporated is the applicant for protection in this case being:

- a.) The incorporated business registered in Delaware for and within regular employees have bred B1614ml.
- b.) The proprietary owner and intending commercial seller of B1614ml.